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FO-12 BBS System Up and Running!

The long-awaited Bulletin Board System (BBS) of Fuji OSCAR 12 has been successfully loaded and is apparently functioning well. Over a hundred messages were estimated to have been posted and received in its first few days of operation. This comes after more than 10 months hard work and disappointment with earlier software problems and constraints on use imposed by a tighter than expected power budget.

The BBS software was loaded by JAMSAT technicians at 0440 UTC, Sunday, June 21 and immediately attracted world-wide attention in the Amateur Radio satellite community.

The following is part of the first-ever frames sent by the FO-12 flying mailbox as reported by JAMSAT spokesman Tak Okamoto, JA2PKI. The report has been edited slightly for clarity.

"Welcome to the FO-12/JAS-1 Flying Mailbox system! We, members of the JAMSAT JAS-1 project team are glad to release the first version of the mailbox software. This version (1.0) has some limitations and is slightly different from the description previously discussed in *QST*, *ASR*, and *JARL News*, etc. Read the message titled "FO-12 Mailbox Usage" for detail.

"This version is opened to the public on an experimental basis. A message posted might be lost by shut-off due to excessive discharge of Ni-Cd battery, or system crash caused by unexpected accident due to excessive discharge of Ni-Cd battery or other system problem. We are very thankful to all the satellite users in the world, who kindly supported this project. JAMSAT JAS-1 Software project team: JR1FIG, JR1ING, JJ1BTC and JK1VXJ."

The available command structure is, for the present, as follows:

Version 1.0 of the mailbox program has following commands:

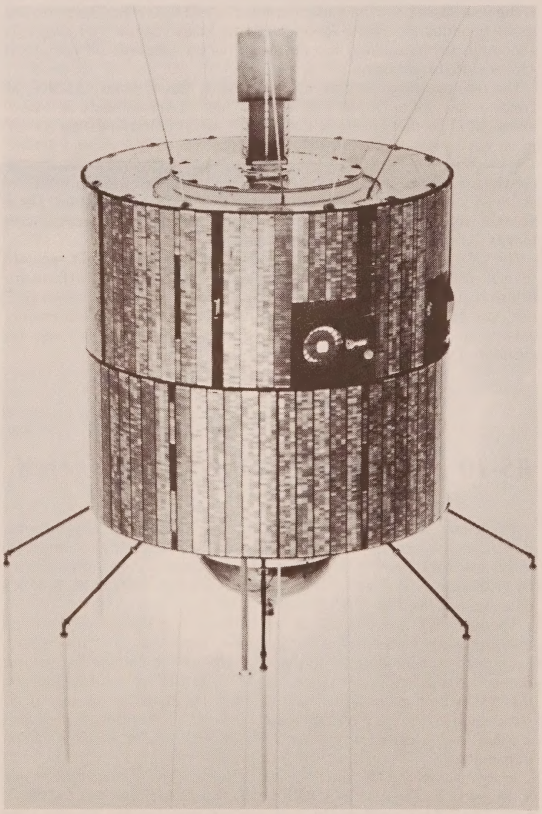
F	:	List latest 10 message headers with message number
F*	:	List all the message headers.
R (n)	:	Read a message numbered (n)
W	:	Send a message. You will be asked receiver and subject. Send (CR) . (CR) or (CR) ^ Z (CR) to end the message
K (n)	:	Kill a message numbered (n). A message being read by other station(s) cannot be killed. FO-12 BBS is a multi-user system. Only originator of the message can kill messages.
H	:	Help.

Your TNC should be set as follows:

Protocol	:	Version 2 WA8DED PROMs are needed for TNC-1. Command TNC-1 : v2 TNC-2 : Ax25l2 <2 ON
T1 timer	:	6 seconds or longer Command TNC-1 : F6 TNC-2 : FRack 6
Max Frames	:	2 or 3 is suggested. Command TNC-1 : O2 or O3 TNC-2 : MAX 2 or MAX 3

Call sign of FO-12 which you use to connect is 8J1JAS. The number of messages is limited to 50. If more than 50 messages are posted, older ones will be overwritten. Maximum available memory for message storage is 192 kilobytes. There will be no command to logout. Simply disconnect using the TNC's disconnect command. No personal mail will be supported by this first version. Your messages can be read by anyone and you can read messages addressed to someone else.

While the BBS is in operation, the digital repeater is disabled. Digipeated packets will not be accepted by FO-12. Increasing the number of users will slow response and require longer T1 time. On the other hand, if you are the only user of the mailbox, T1 = 3 may be acceptable. The maximum acceptable length of the data portion of a packet (PACLEN) is 199. It should be set shorter. FO-12 transmits at PACLEN = 128 and MAXFRAMES = 1. This information is preliminary and may be changed without advance notice.



ATS-3, NASA's Applications Technology Satellite, was launched in 1967 but is still in limited operation in a near-geosynchronous orbit. It now covers the entire western hemisphere and much of the Pacific basin. AMSAT will be teaming with ARRL and TAPR to propose to NASA a suite of communications technology experiments on ATS-3. These will help pave the way for AMSAT's Phase 4 bird by 1991. (See story.)

The important telemetry channels are as follows:

#00 Solar cell current	= 1.91*(N-4) mA
#01 Battery current	= 3.81*(N-528)mA
#02 Battery voltage	= N/1000*21.0 V
#27 Bat depth of discharge	= (N-500)/189 AH

A message from JARL was posted on Sunday, June 21. It said:

"Hello friends, Here, we partake in joys with you of the opening of the mailbox of FO-12 that has been longed for. I hope you will enjoy packet radio via amateur satellite Fuji. Greeting JA1AN, S. Hara, President, JARL."

The first North American BBS access was around 1800 UTC on June 21 when WB5IPM tapped in according to VE3JF. Users listed in a recent sample of the BBS menu included: JM1MCF, ZS6IT, DB2OS, ON6UG, VE3JF, KA9LNV, WB5IPM, I0JX, DL1CF, HB9MHM, JA3XJK, JA2PKI, G3RUH, WA8EBM, ON5PV.

Congratulatory messages filled the mailbox for the first few days of operation. DB2OS suggested he could relay traffic to Germany over a German terrestrial network called Nord Link. ZS6IT sent: "Greetings to satellite packet operators worldwide from SA AMSAT. Congratulations to satellite software and control team in Japan."

UoSAT OSCAR 11 DCE and Packet Net Connects RSGB and ARRL

In a symbolic but significant achievement, a greeting message originated at the headquarters of the Radio Society of Great Britain has been relayed to the headquarters of the American Radio Relay League. The relay was accomplished by satellite and terrestrial packet networks all within the Amateur Radio domain.

The message originated by RSGB Secretary David Evans, G3OUF, in London was sent to UoSAT OSCAR 11's Digital Communications Experiment (DCE) by the Surrey DCE station. It was then retrieved by K1KSY in Massachusetts. K1KSY recently commissioned his DCE ground station. The message was then relayed via the terrestrial packet radio network to Newington, Connecticut, via W1AW-4. It was then delivered to ARRL Executive Vice President David Sumner, K1ZZ, at ARRL headquarters. Dave Sumner wryly observed the relay from Massachusetts to Connecticut took longer than the relay across the Atlantic.

The UO-11 DCE has been in operation for several years but recently several additional DCE ground stations and special authorization from the British regulatory authorities have facilitated the new milestones in DCE use. Monitoring the DCE or other UO-11 data at 1200 bps requires only a terminal and a surplus type 202 modem. UO-9 data can also be monitored with the same setup.

RS-10 and RS-11 Telemetry Delineated

The launch of RS-10 and RS-11 has resulted in a flurry of new information concerning operation of the new birds. The following telemetry information is the latest to be revealed. It's based on information provided by PAØDLO (see *ASR* #152) and more recent data from G3IOR. G3IOR's data was supplied by UA3CR recently.

The telemetry is sent in CW. It represents various status indicators and measurements made on the transponders. There are 16 channels sent. Each channel sent is in the format of 2 alpha characters followed by 2 numeric characters. For example, "IG35". The "IG" part is the alpha and the "35" is the numeric part of each channel. The alpha part gives a specific status such as "on" or "off" for a specific feature. The numeric part gives a value for a variable of interest such as temperature of the 10 meter transmitter.

In the example, IG35, the "IG" part gives a specific status for channel 4, 21 MHz receiver status. "IG" means the 21 MHz receiver is off. If, however, "IG" is replaced by "NG" in channel 4 as in "NG35", then the 21 MHz receiver is activated. The numeric part of channel 4, "35" in our example, gives the AGC level on the 15 meter receiver where the value in volts equals the number sent divided by 5. That is, volts = n/5 or 35/7 = 7 volts. (See table below).

In the table below, the alpha part of a channel is designated by "A" and the numeric part by "N" as in channel "1A" and "1N".

Channel Number	Status Designators	Meaning/ Equations
1A	IS =	Telemetry data source sampling period 90 minutes or
	NS =	Telemetry data source sampling period 10 minutes
1N		Power supply voltage over sample period where V = n/4 volts.
2A	IR =	2 meter receiver with -20 dB attenuator in or
	NR =	2 meter receiver with -20 dB attenuator out
2N		Output power of 2 meter transmitter where W = n/10 in watts
3A	ID =	15 meter receiver with -10 dB attenuator in or
	ND =	15 meter receiver with -10 dB attenuator out
3N		Output power of 10 meter transmitter where W = n/10 in watts
4A	IG =	15 meter uplink off or
	NG =	15 meter uplink on
4N		15 meter receiver AGC voltage where V = n/5 in volts
5A	IU =	2 meter receiver off or
	NU =	2 meter receiver on
5N		2 meter receiver AGC voltage where V = n/5 in volts
6A	IW =	Special command station channel off or
	NW =	Special command station channel on
6N		Special command station AGC voltage where V = n/5 in volts
7A	IK =	Output power of 10 meter beacon = 1 watt or
	NK =	Output power of 10 meter beacon = 300 milliwatts
7N		Service command parameter, 10 meter mode
8A	IO =	Output power of 2 meter beacon = 1 watt or
	NO =	Output power of 2 meter beacon = 300 milliwatts
8N		Service command parameter, 2 meter mode
9A	AS =	Status of 1st memory board = off or
	MS =	Status of 1st memory board = on
9N		10 meter transmitter temperature where T = n-10 in degrees C
10A	AR =	Status of 2nd memory board = off or
	MR =	Status of 2nd memory board = on
10N		2 meter transmitter temperature where T = n-10 in degrees C
11A	AD =	Special service channel for loading memory is open or
	MD =	Special service channel for loading memory is closed
11N		20 volt power supply temperature where T = n-10 in degrees C
12A	AG =	Code Store memory status is open or
	MG =	Code Store memory status is closed
12N		9 volt power supply temperature where T = n-10 in degrees C
13A	AU =	Output information from memory via 10 meter beacon or
	MU =	Output information from memory via 2 meter beacon
13N		Control parameter backup 9 V power supply where V = n/5 volts
14A	AW =	Attenuator of 15 meter ROBOT receiver = -10 dB or
	MW =	Attenuator of 15 meter ROBOT receiver = 0 dB
14N		IF voltage of 15 meter ROBOT receiver where V = n/5 in volts
15A	AK =	Attenuator of 2 meter ROBOT receiver = -10 dB or
	MK =	Attenuator of 2 meter ROBOT receiver = 0 dB
15N		IF voltage of 2 meter ROBOT receiver where V = n/5 in volts
16A	AO =	Special command channel 2 meter output power = 1 watt or
	MO =	Special command channel 2 meter output power = 300 milliwatts
16N		ROBOT QSO counter where 00-32 QSOs logged is indicated as 00 and 33 - 128 QSOs is indicated by values in the range of 80 - 99

New Russian Satellite Carries Multi-Transponder Packages

The Radio Moscow announcement said COSMOS 1861 had been launched earlier in the day. That was Tuesday, June 23. The announcement set in motion a mechanism which soon confirmed the Radio Moscow announcement which had been awaited for months. The announcement said COSMOS 1861 carried Amateur Radio communications relay equipment in addition to its primary scientific and communications research payload. The new RS's were aloft at last!

Within hours G3IOR had his first access and QSO confirming the new birds were up and running. But no RS-9 was among these birds. Surprisingly they were signing RS-10 and RS-11 on their telemetry and ROBOT channels.

Soon WØCY was also reporting access and initial tracking information. UA3CR, visiting in Canada, was contacted by WA2LQQ. Although UA3CR was at that time unaware the launch had occurred, he was able to provide critical information and clarification of key technical parameters earlier provided by W4KM. W4KM had just a week earlier provided detailed frequency information on the basis of a translation he had done from the May edition of *Radio* magazine. But Leo, UA3CR, was able to eliminate some remaining ambiguity in the data and expand further upon it.

RS-10 and RS-11 are, according to current information, identical except with regard to frequency. Each apparently uses 3 bands in various combinations to achieve 5 distinct modes of operation in addition to its auxiliary ROBOT repeaters. On each unit, 15 meters is used exclusively as an uplink band, 10 meters is used exclusively as a downlink band and 2 meters can be employed as either an uplink or downlink band.

Specifically:

Mode K uses 15 meters up and 10 meters down. Mode T uses 15 meters up and 2 meters down. Mode A uses 2 meters up and 10 meters down. Mode KT uses 15 meters up and both 10 and 2 meters down. Mode KA uses both 15 and 2 meters up and 10 meters down.

The new modes KT and KA are simply combinations of modes K and T and A.

The following are the frequencies for the two new RS's:

RS-10:

Mode	Uplink Band	Downlink Band
K	21.160 - 21.200	29.360 - 29.400
T	21.160 - 21.200	145.860 - 145.900
A	145.860 - 145.900	29.360 - 29.400
KT	21.160 - 21.200	29.360 - 29.400 and 145.860 - 145.900
KA	21.160 - 21.200 and 145.860 - 145.900	29.360 - 29.400

Beacons: 29.357, 29.403, 145.857 and 145.903.
The RS-10 ROBOT uplinks are 21.120 and 145.820 MHz.

RS-11:

Mode	Uplink Band	Downlink Band
K	21.210 - 21.250	29.410 - 29.450
T	21.210 - 21.250	145.910 - 145.950
A	145.910 - 145.950	29.410 - 29.450
KT	21.210 - 21.250	29.410 - 29.450 and 145.910 - 145.950
KA	21.210 - 21.250 and 145.910 - 145.950	29.410 - 29.450

Beacons: 29.407, 29.453, 145.907 and 145.953.

The RS-11 ROBOT uplinks are 21.130 and 145.830 MHz.

On both RS-10 and RS-11, it is thought the beacons can carry telemetry as well as carry the ROBOT downlinks.

The transponder power outputs are 5 watts; these birds should be very loud. No operating schedule has thus far been announced. There is some concern that the primary payload, COSMOS 1861, which has a 150 MHz downlink, is interfering with RS-10 and RS-11's 2 meter receiver. This may drive the operating schedule in favor of modes K and T with their 15 meter uplinks and away from mode A with its 2 meter uplink.

RS-10 and RS-11 were launched at 0724 UTC on June 23 from a Soviet launch site thought (but not yet confirmed) as Plesetsk. The primary payload is COSMOS 1861 a navigation transponder. RS10 and RS-11 share the spacecraft with the primary payload. They share the power and other support from the overall spacecraft system. There is thus but one spacecraft populated by at least three payloads: RS-10, RS-11, COSMOS 1861.

The desired orbit was attained very precisely. The nodal period is 105.0245 minutes; the orbital increment is 26.3824 degrees west per orbit. A reference orbit for Sunday, July 5 is: 00:14:31 at 61.2 degrees West. Average height is close to 1000 km (621 miles). In comparison to other OSCARs, the new RS's are higher than UO-11 at 700 km, higher than AO-8 at 900 km, but lower than AO-7 at 1400 km. In fact, RS-10 and RS-11 are much lower than any prior RS's. RS-1 through RS-8 were very high for Low Earth Orbiters (LEOs) at 1700 km. This may have substantially decreased their life expectancy since they came close to the lower edges of the Van Allen radiation belts at that altitude. Prospects are RS-10 and RS-11 will perform much longer at 1000 km. Moreover, their altitude assures they will maintain stable orbits for several decades at least.

NORAD has designated COSMOS 1861 (and its parasites RS-10 and RS-11) object 18129. Its international designation is 87-54A. The first NASA element set issued is as follows:

Element Set:	20
Ref Epoch:	87 186.48411794
Inclination:	82.9260
RAAN:	44.5413
Eccentricity:	0.0009224
Argument of Perigee:	231.8894
Mean Anomaly:	128.1418
Mean Motion:	13.71882498
Decay Rate:	6.0e-08
Rev #:	167

RS-10 and 11 were built at the Tsiolkovskiy Museum for the History of Cosmonautics in Kuluga an industrial center 180 km southwest of Moscow. The chief architects of the transponders called BRTK-10 were Aleksandr Papkov and Viktor Samkov. BRTK stands for the Russian equivalent of "Equipment for Radio Amateur Satellite Communication". The overall project management is in the hands of DOSAAF, a military-related organization whose major mission is the training of pre-draft-age youth in militarily significant technology.

The Soviet news agency TASS said the primary payload, COSMOS 1861, was intended to work within the space navigational system with the aim of determining the position of vessels belonging to the USSR's sea going and fishing fleets at any point in the world ocean. The system is similar to the U.S. NAVSTAR Global Positioning System (GPS). The navigation part of COSMOS 1861 may also be used by UA3CR during his joint USSR-Canadian polar expedition next winter.

Team To Propose Experiments On Veteran NASA Bird

Representatives of AMSAT, ARRL and TAPR recently met with NASA managers and engineers at the NASA Lewis Research Center in Cleveland to map out plans for experiments on the NASA ATS-3 geosynchronous spacecraft. The general plan calls for experiments in new technology and exercising emergency communications systems.

Of particular interest to all parties are potentially significant gains in voice and data transmission effectiveness using digitized voice and advanced modem technology.

ATS-3 is a veteran spacecraft some 20 years old. (See picture). It uses VHF uplinks and downlinks straddling the Amateur 2 meter band. It is thus convenient for authorized experiments using readily available equipment. AMSAT, ARRL and TAPR believe ATS-3 could be a helpful test bed for developing and proving technologies and operational concepts for AMSAT's Phase 4 satellite planned for about four years hence.

Representing TAPR at the meeting was Lyle Johnson, WA7GXD. Paul Rinaldo, W4RI represented ARRL while Vern Riportella, WA2LQQ, Tom Clark, W3IWI and Art Feller, KB4ZJ represented AMSAT. Tom and Art were tied in by telephone. NASA representatives included Art Anzic, K8BVI; Al Downey, N8DZD and Mike Cauley, AK8Y.

TAPR's FO-12 modem, which has the 1200 baud PSK modem built in, will become an important experimental apparatus on the ATS-3 tests. Packet radio experiments using FSK had previously been tried on ATS-3 with poor results. The improvement using the PSK modems is anticipated to be substantial. The TAPR DSP Project will also likely find useful data resulting from the ATS-3 experimental protocol.

ATS-3 currently serves a variety of users in the Pacific and Antarctica with various voice and data services. It has expended its station keeping fuel and its orbit is now inclined about 12 degrees to the equator. Nevertheless, its potential to "Serve as a test bed for Phase 4, pointed out by PY2BJO last December, makes it attractive.

Experiments To Set Stage For Techno-Sport

Joe Bijou, WB5CCJ, says he's interested in working with Amateurs who are competent in making satellite Doppler measurements. Joe is looking to set up some experiments to determine how well individuals can actually do in determining the Doppler shift and position of the satellite using conventional equipment and techniques. These experiments may be important in terms of AMSAT's planned Techno-Sport activity next year on Phase 3C. One major component of the Techno-Sport activity will be hidden transmitter location via satellite. For further information, please contact Joe at Silicon Solutions, 713-661-8727.

Field Day Results On AO-10 Reported Good

AO-10 continues its fine performance with sun angles at near-optimum. Field Day activity was the best it's been in years with scores of Field Day stations garnering bonus points for QSOs on AO-10.

The operating schedule in effect through July 20 is Mode B from MA 20 through 250. After July 20 a slight reduction in operating time will be made to reflect the decreasing sun angles due to seasonal changes. Watch for announcements of the operating schedule.

Seven Director Nominees to Vie for Four Seats On Board

The nominating period for AMSAT Director is now complete. The nominees include 3 incumbents and 4 others. The incumbents nominated are John Browning, W6SP; John Henry, VE2VQ and Jan King, W3GEY. Other nominees include John Champa, K8OCL; Andy MacAllister, WA5ZIB; Bob McGwier, N4HY and Bill Tynan, W3XO. Biographies of candidates will be published in *ASR* in about a month. Ballots will be included in the issue.

Ariane Launches To Resume Next Month

Sources indicate Arianespace's plans to resume launches from Kourou with the V-19 mission next month are on schedule. Getting this launch off on schedule is essential if the previously announced schedule is to hold. That schedule shows AMSAT's Phase 3C aboard Ariane V-22. At present V-22 is scheduled for January 1988. AMSAT is planning for the January date but believes a launch late in the first quarter of 1988 is likely even if V-19 is successful next month and the subsequent launches, V-20 and V-21, are similarly successful.

Ariane launches have been on hold for a year after the V-18 third stage developed an ignition problem resulting in the total loss of the mission. A new ignitor has now been qualified and thoroughly tested. The V-19 mission will be the first to fly the new ignitor in its state-of-the-art cryogenic third stage.

Short Bursts

- AMSAT Chairman John Browning, W6SP, will be teaming with Cliff Buttschardt, W6HDO, on the AMSAT Pacific Coast Net on Tuesday evenings at 2000 Pacific time. The net will be simulcast on 75 meters and 2 meters. The frequencies are 3840 kHz and 144.144 MHz.
- *AMSAT Technical Journal* Editor Bob Diersing, N5AHD, says work on the historic first edition is now complete and ready for distribution. The first edition contains papers from around the world on the subject of Amateur Radio satellites, tracking and telemetry. A limited number of these first rate technical journals are available. You must order them directly from AMSAT Headquarters before they run out. The price is $10 plus shipping.
- Membership promotion is the theme of two major thrusts by AMSAT HQ as the convention and hamfest season swings into high gear. This year AMSAT has two significant membership programs aimed at encouraging current members to renew early and for members to encourage their friends and acquaintances to become AMSAT members too. AMSAT members are urged to renew their memberships now and avoid a possible dues increase later this year.

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Three Major Satellite Programs Achieve New Heights

In a remarkable period, three Amateur Radio satellite programs made important strides demonstrating the vitality and breadth of achievement in the field. UoSAT OSCAR 11's DCE combined with terrestrial packet networks to demonstrate connectivity between RSGB and ARRL headquarters. Fuji OSCAR 12's BBS system was placed in operation providing the first generally available satellite packet radio store-and-forward system. And RS-10 and RS-11 were launched and placed in operation. Remarkably, this all happened within a three-day period, June 21, 22 and 23. This *ASR* will focus on this significant conjunction of events in OSCAR history.

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